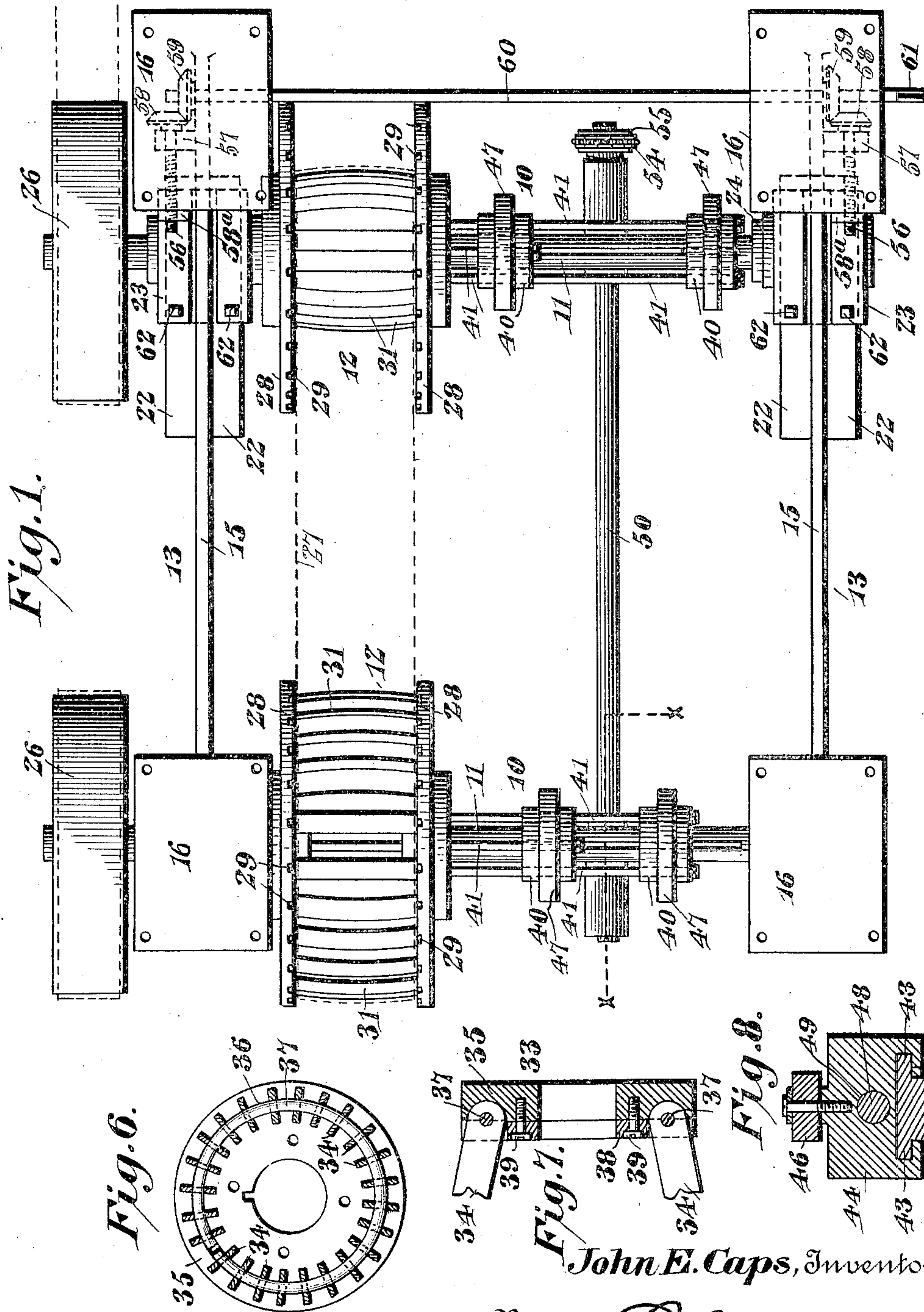


J. E. CAPS.
VARIABLE SPEED MECHANISM.
(Application filed June 14, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
Jas. K. McLaughlin
B. H. Foster

By

John E. Caps, Inventor

E. G. Singer
Attorney.

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2 Sheets—Sheet 2.

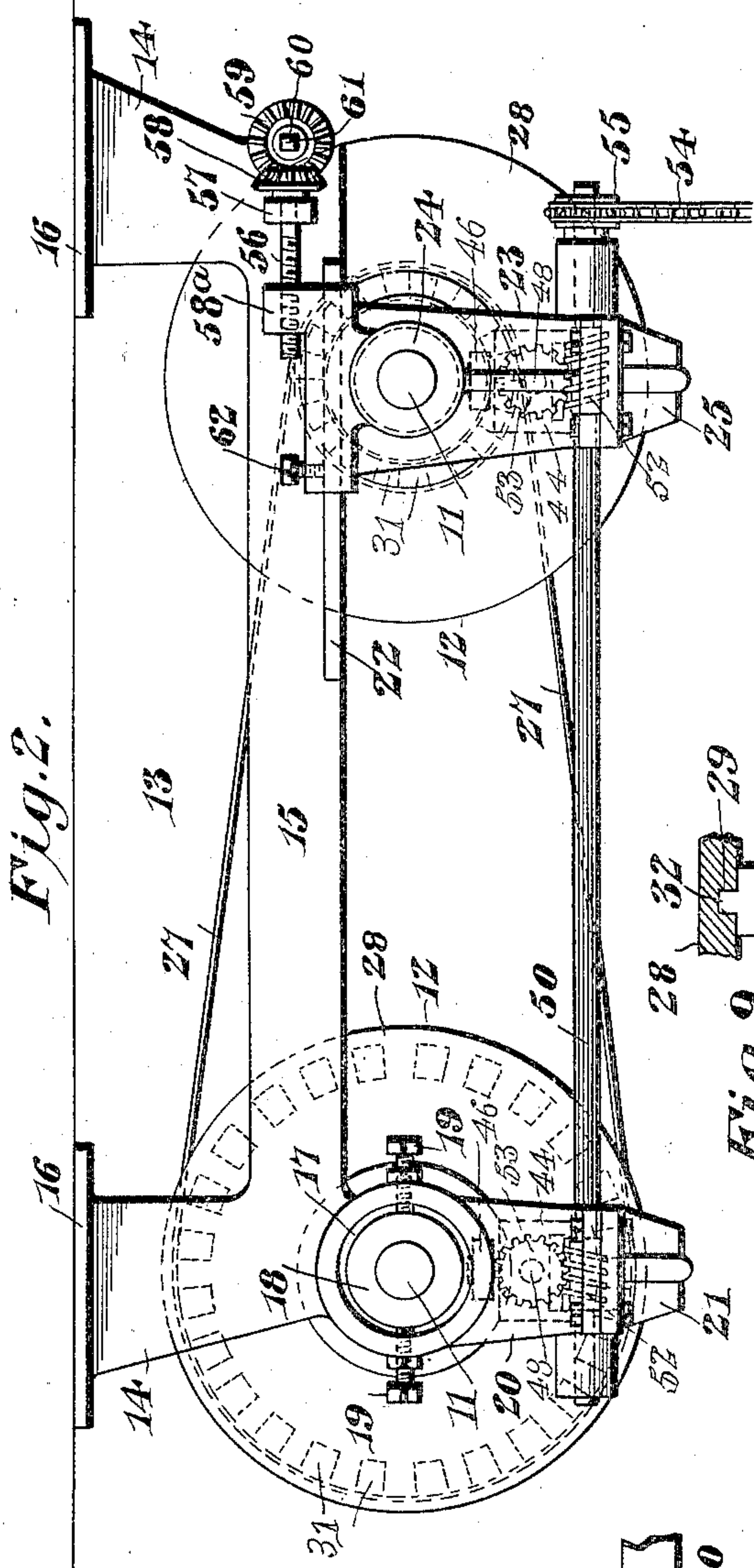
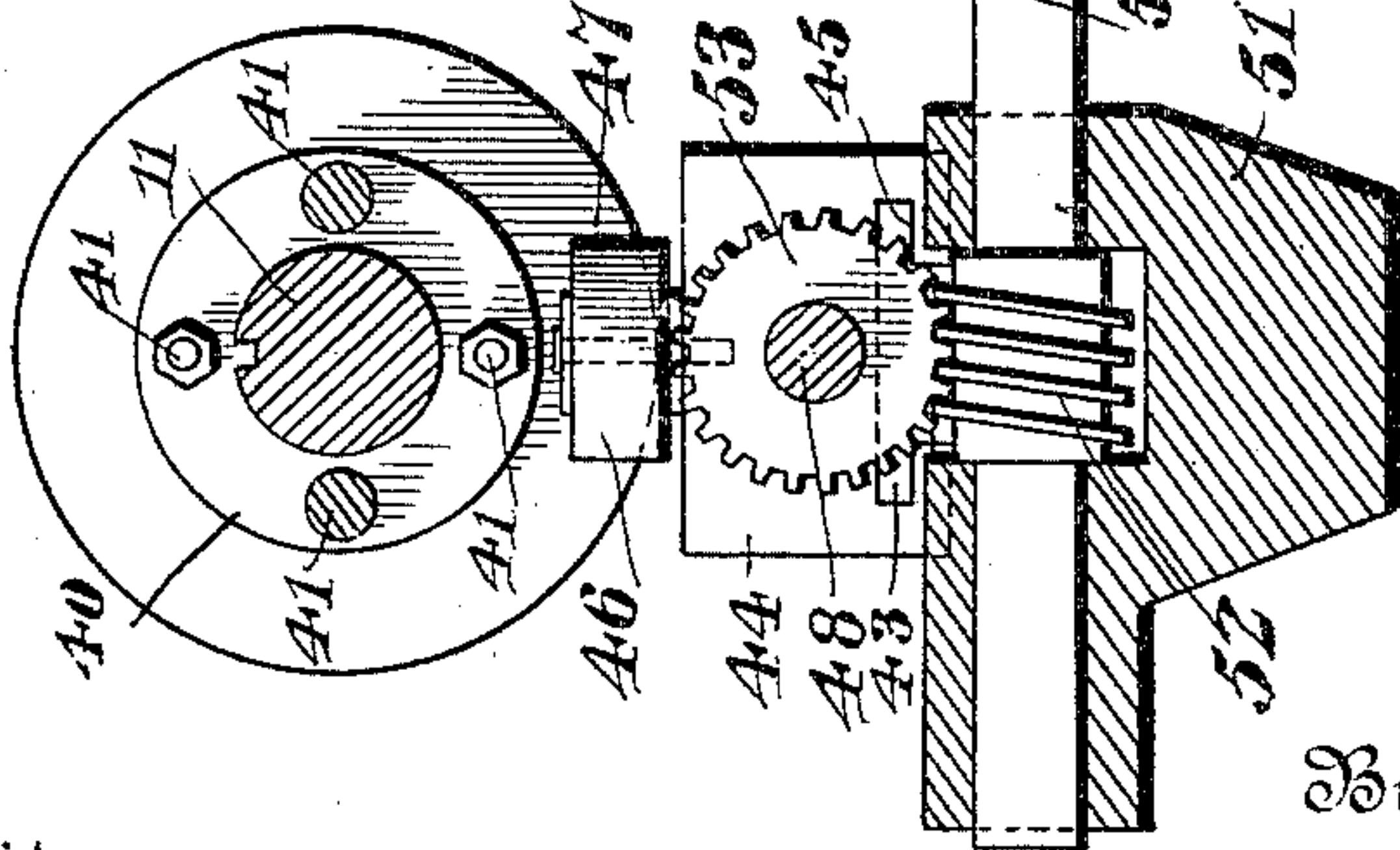


Fig. 2.



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Fig. 9.

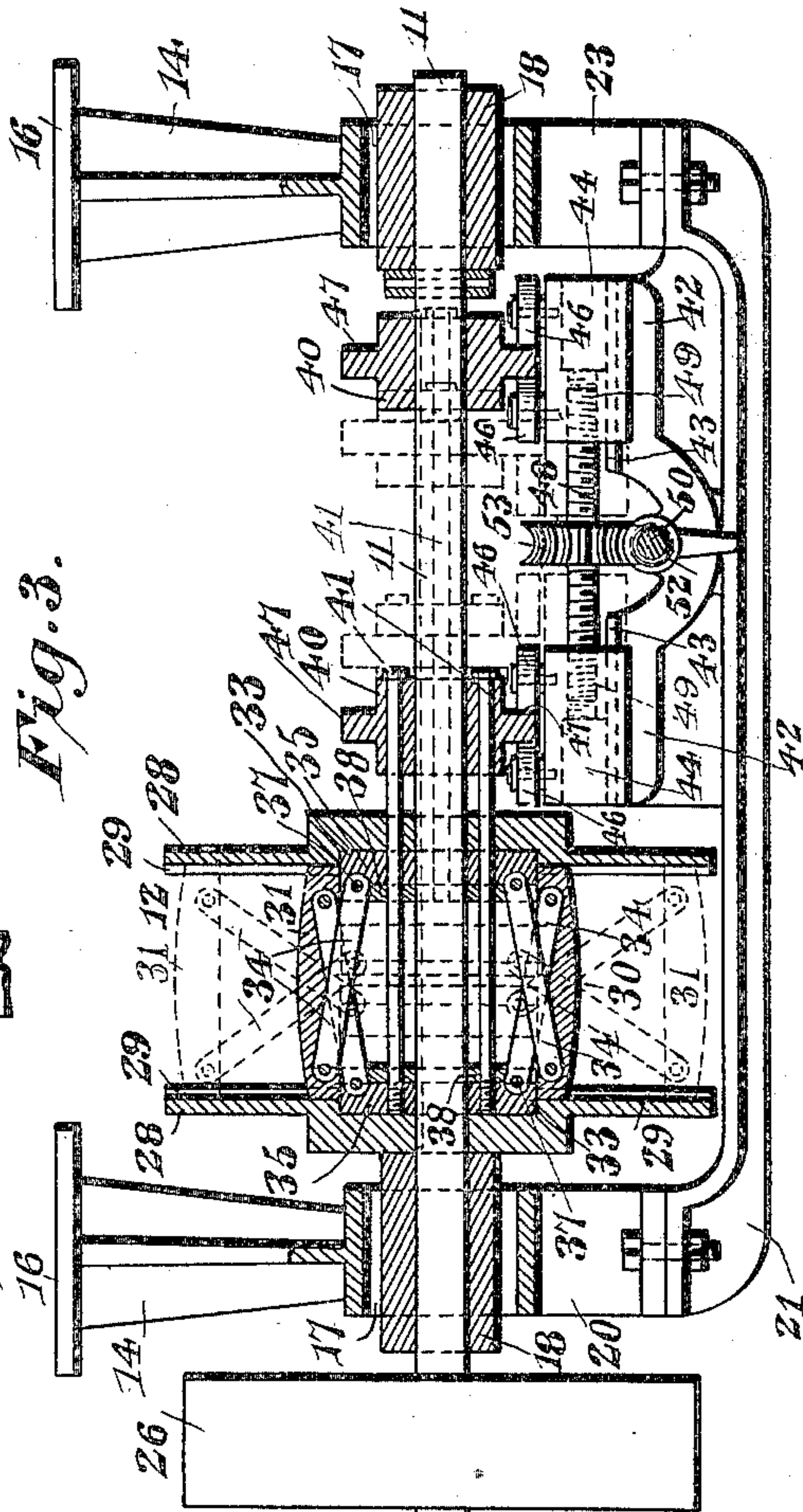


Fig. 3.

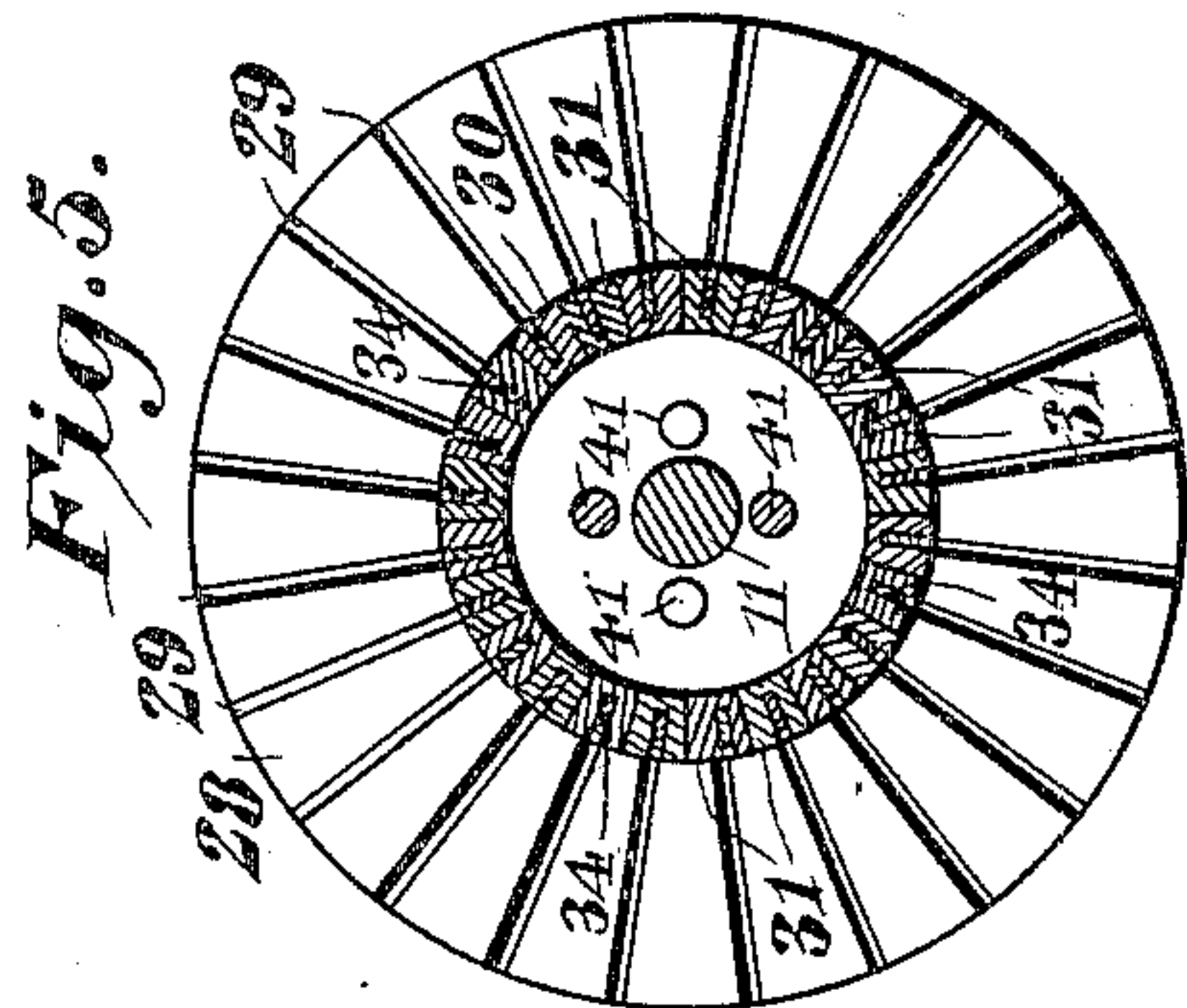


Fig. 5.

John E. Caps, Inventor

By *E. J. Siggers*
Attorney

UNITED STATES PATENT OFFICE.

JOHN EDWARD CAPS, OF KANSAS CITY, MISSOURI.

VARIABLE-SPEED MECHANISM.

SPECIFICATION forming part of Letters Patent No. 701,293, dated June 3, 1902.

Application filed June 14, 1901. Serial No. 64,584. (No model.)

To all whom it may concern:

Be it known that I, JOHN EDWARD CAPS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented a new and useful Variable-Speed Mechanism, of which the following is a specification.

The present invention relates to variable-speed mechanism, and especially to that class comprising expansible pulleys which are connected by a belt, together with means for simultaneously expanding one pulley and contracting the other.

One of the objects of this invention is to greatly improve the pulley by providing an expansible rim and means for holding said rim rigidly in adjusted position, at the same time employing adjusting means of a simple character that may be readily and easily operated.

Another and very important object is to improve mechanism for simultaneously expanding and contracting the respective pulleys, so that they will be positively held in their respective relations without danger of accidental contraction or expansion.

A still further object is to improve the supporting-frame and provide means in connection therewith for adjusting the distance between the pulleys, so that the connecting-belt may be readily tightened.

In the following specification there is described the preferred embodiment of the present invention, and the construction set forth therein is illustrated in the accompanying drawings. It will of course be understood that the construction thus shown and described is capable of modification and change within the scope of the appended claims.

In the drawings, Figure 1 is a top plan view of variable-speed mechanism embodying the present invention. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical longitudinal section through one of the pulleys and the operating mechanism therefor. Fig. 4 is a detail vertical cross-section taken on the line X X of Fig. 1. Fig. 5 is a vertical sectional view through one of the pulleys, showing the rim in contracted position. Fig. 6 is a detail view of a section of one of the adjusting-heads. Fig. 7 is a vertical sectional view through one of said heads. Fig. 8 is a sec-

tional view through an adjusting-block, and Fig. 9 is a detail view showing the manner of connecting the rim-sections and the face-plates of the pulleys.

Similar numerals of reference designate corresponding parts in all figures of the drawings.

In carrying out the invention, as shown in the accompanying drawings, a driving member and a driven member are employed, which are designated as a whole by the reference-numeral 10, these elements each comprising a shaft 11, a pulley 12, mounted upon said shaft, and adjusting mechanism for each pulley. They are mounted upon a suitable frame, (designated as a whole by the numeral 13.) This frame comprises hanger-sections each of which consists of legs 14, connected by a strut 15, said legs having suitable feet 16, by means of which the frame may be secured to a ceiling or other support. Each hanger-section has at one end an opening 17, in which is mounted a journal-box 18, secured therein by suitable means, such as adjusting-screws 19. Located beneath these journal-boxes are depending brackets 20, the lower ends of which are connected by a transverse brace 21. The other end of each hanger-section is provided upon its opposite faces with horizontally-disposed flanges 22, said flanges being located along the lower edge of the strut 15. A stirrup 23 is slidably suspended upon the supporting-flanges 22 of each hanger-section, each of said stirrups being provided with a journal-box 24 and connected by a transverse brace 25.

Passing, respectively, through the alined boxings 18 and the boxings 24 are the driving and driven shafts 11, said shafts projecting beyond one side of the supporting-frame and having secured thereto suitable pulleys 26. Mounted upon these shafts between the hanger-sections are the expansible pulleys 12, connected by a belt 27. As these pulleys are similar in all respects, but one will be described.

A pair of spaced face-plates 28 are keyed or otherwise secured to the shaft 12 and have radial grooves 29 in their opposing faces. Mounted between these plates is the expansible rim 30, comprising a plurality of sections 31, each of which has tongues 32 at its

opposite ends, which engage in opposite grooves 29 of the face-plates. These sections when in their inner position, as shown in Fig. 5, form a continuous rim and can be moved to their outermost position contiguous to the annular edges of the face-plate, as indicated in dotted lines in Fig. 2. A pair of heads 33 are mounted upon the shaft 12 between the face-plates, said heads being keyed to the shaft so as to revolve therewith, but having a sliding movement toward and from each other. A pair of cross-links 34 are pivotally secured to the opposite ends of each rim-section 31 and have their inner ends secured, respectively, to the heads 33. The preferable manner of securing said links to the heads is clearly shown in Figs. 6 and 7. These heads each comprise a body 35, having an annular groove 36 in one face, which groove receives a split ring 37, that passes through the ends of the links 34. A cap-plate 38 is secured over the ring by means of screws 39 or other suitable fastening devices. It will thus be seen that when the heads 33 are moved toward each other the ends of the links carried by said respective heads will be correspondingly moved, thus forcing the rim-sections outwardly toward the periphery of the face-plates, as is indicated in Fig. 3. For the purpose of operating these heads a pair of collars 40 are slidably mounted upon the shaft exterior of the face-plates, each collar being independently connected to one of the heads 33 by means of rods 41, that pass through the adjacent face-plate 28, the rods connecting the farther head also passing through the nearer one. These pairs of rods are preferably located at right angles to each other, so that they will not interfere.

Located beneath the collars 40 is a yoke 42, the arms of which are provided with tracks 43, disposed longitudinally of and beneath the shaft 11, these tracks being substantially T-shaped in cross-section. Adjusting-blocks 44 are slidably mounted upon these tracks, being provided with undercut grooves 45, that receive said tracks. These blocks each carry upon their upper faces a pair of spaced horizontally-disposed antifriction-wheels 46, that engage opposite sides of an annular peripheral flange 47, arranged upon each collar 40. A screw-threaded shaft 48 is located between the adjusting-blocks 44 and is provided with right and left handed screw-threads that engage correspondingly-threaded openings 49 in said blocks. It will therefore be seen that by rotating the shaft 48 the adjusting-blocks will be moved toward or from each other, the collars 40 and heads 33 will be correspondingly moved, and the rim will therefore be expanded or contracted.

The means for simultaneously expanding and contracting the pulleys of the driving and driven elements is as follows: A shaft 50 extends transversely of the driving and driven elements and is located between the adjusting-blocks 44 below the connecting-

screws 48 thereof, said shaft being mounted in suitable bearings 51. This shaft is provided with right and left handed worm-threads 52, that engage correspondingly-toothed worm-wheels 53, secured to the respective screws 48. Any suitable means may be provided for operating the shaft 30, in the present instance a sprocket-chain 54 being shown, which passes over a sprocket-wheel 55, located upon one end of said shaft.

The mode of operation of this device will be readily apparent to those skilled in the art. A driving-belt is placed over one of the pulleys 26, which belt is connected with any suitable source of power, and from the end pulley of the other shaft a belt extends to the machinery to be driven. Power will therefore be transmitted through the medium of the intermediate belt 27 from the driving to the driven shaft. Assuming that it is desired to have the driven element rotated at a lower speed than the driving element, the shaft 50 is rotated so that the rim of the intermediate pulley of the driving element will be contracted. This will correspondingly expand the pulley-rim of the other element, and the speed of said pulley will thus be decreased. On the other hand, if it is desired to increase the speed of the driven element the shaft 50 is rotated in an opposite direction, whereupon the reverse of the above-described operation will take place.

It is a well-known fact that belting will in time stretch, and to provide for this contingency novel mechanism is employed for increasing the distance between the driving and the driven elements. This mechanism is as follows: A horizontally-disposed adjusting-screw 56 is rotatably mounted in a keeper 57 upon the exterior face of each of the hanger-sections, this screw passing through a threaded opening in an upstanding lug 58^a, located upon the upper edge of the slidably-suspended stirrup. Each screw 56 carries at its forward end a bevel gear-wheel 58, that meshes with a similar gear 59, located upon a horizontal shaft 60, that extends transversely across the ends of the two hanger-sections, said shaft being provided with a squared end 61, to which may be attached a wrench or other adjusting device. A pair of set-screws 62 may also be mounted upon the stirrups to engage the supporting-flanges 22, so as to lock said stirrups against movement. Thus by rotating the shaft 60 the screws 56 will also be rotated and the stirrups drawn toward the end of the frame. The driving element will therefore be moved away from the driven element and the belt connecting the two consequently tightened.

It will be seen that the construction thus set forth accomplishes all the objects stated in the preliminary portion of the specification, first, in that the rim-sections are supported at their opposite ends, so that there is no liability of their wobbling or becoming loosened. Because of the arrangement of the

several screw-threaded shafts and the worm-wheels there is small chance of their being accidentally rotated by the jar of the machinery, and the expansible pulleys will thus be securely locked in their adjusted relation. Furthermore, means are provided whereby one of the elements may be moved toward or from the other, so that the connecting-belt may be tightened.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In apparatus of the class described, the combination with a shaft, of a pulley mounted upon the shaft and comprising spaced face-plates and an expansible rim located between the plates, means for expanding and contracting the rim, said means including a head slidably mounted upon the shaft between the face-plates and within the rim and having a connection with said rim, and mechanism for moving the head upon the shaft.

2. In apparatus of the class described, the combination with a shaft, of a pulley mounted upon the shaft and comprising spaced face-plates and an expansible rim arranged between the face-plates, means for expanding and contracting the rim, said means including heads mounted upon the shaft between the face-plates and within the rim, said heads being movable toward and from each other, and operating mechanism for moving the heads.

3. In apparatus of the class described, the combination with a shaft, of a pulley mounted upon the shaft and comprising spaced face-plates and an expansible rim arranged between the face-plates, heads mounted upon the shaft between the face-plates and within the rim, said heads being movable toward and from each other, links connecting the rim and heads whereby the said rim will be expanded and contracted upon the movement of the heads, and operating mechanism for moving said heads.

4. In apparatus of the class described, the combination with a shaft, of a pulley mounted upon the shaft and comprising spaced face-plates and an expansible rim arranged between the face-plates, heads mounted upon the shaft between the face-plates and within the rim, said heads being movable toward and from each other, crossed independent links connecting the rim and heads, whereby the said rim will be expanded and contracted upon the movement of the heads, and operating mechanism for moving said heads.

5. In apparatus of the class described, the combination with a shaft, of a pulley mounted upon the shaft and comprising spaced face-plates and an expansible rim located between the plates, means for expanding and contracting the rim, said means including a head slidably mounted upon the shaft between the plates and within the rim and having a connection with said rim, a collar slidably mounted upon the shaft exteriorly of the pulley and having a connection with the head, and means for sliding said collar.

6. In apparatus of the class described, the combination with a shaft, of a pulley mounted upon the shaft and comprising spaced face-plates and an expansible rim arranged between the plates, heads slidably mounted upon the shaft between the face-plates and movable toward and from each other, connections between the heads and rim, and adjusting elements located upon the shaft exteriorly of the pulley and movable toward and from each other, each of said adjusting elements being connected to one of the heads.

7. In apparatus of the class described, the combination with a shaft, of a pulley mounted upon the shaft and comprising spaced face-plates and an expansible rim arranged between the plates, heads slidably mounted upon the shaft between the plates and movable toward and from each other, connections between the heads and rim, adjusting elements located upon the shaft exteriorly of the pulley and movable toward and from each other, each of said adjusting elements being connected to one of the heads, and a screw-threaded shaft located between the adjusting elements and engaging therewith to move them toward and from each other.

8. In apparatus of the class described, the combination with a shaft, of a pulley mounted on the shaft and comprising spaced face-plates and an expansible rim arranged between the plates, a head movably mounted upon the shaft between the face-plates, connections between the head and rim, a slidable adjusting element located exterior of the pulley, and means connecting the head and adjusting elements, whereby when said element is moved, the head will also be moved.

9. In apparatus of the class described, the combination with a shaft, of a pulley mounted on the shaft and comprising spaced face-plates and an expansible rim arranged between the face-plates, heads mounted upon the shaft between the face-plates and within the rim, said heads being movable toward and from each other, means connecting the rim and heads, collars slidably mounted on the shaft exteriorly of the pulley and connected to the heads, and means engaging the collars to move them toward and from each other.

10. In apparatus of the class described, the combination with a shaft, of a pulley mounted on the shaft and comprising spaced face-plates and an expansible rim arranged between the face-plates, heads mounted upon

the shaft between the face-plates and within the rim, said heads being movable toward and from each other, means connecting the rim and heads, collars mounted on the shaft exteriorly of the pulley and connected to the heads, slidably-mounted adjusting-blocks located contiguous to the shaft, each of said blocks having an engagement with one of the collars, and means for moving said blocks toward and from each other.

11. In apparatus of the class described, the combination with a shaft, of a pulley mounted on the shaft and comprising spaced face-plates and an expansible rim arranged between the face-plates, heads mounted upon the shaft between the face-plates and within the rim, said heads being movable toward and from each other, means connecting the rim and heads, collars mounted on the shaft exteriorly of the pulley and connected to the heads, slidably-mounted adjusting-blocks located contiguous to the shaft, each of said blocks having an engagement with one of the collars, a screw-shaft located between the ad-

justing-blocks and engaging therewith, and means for rotating the screw-shaft. 25

12. In apparatus of the class described, a driving and a driven element, each element comprising a shaft, a pulley mounted upon each shaft and having an expansible rim, means for expanding and contracting said rim, said means including heads mounted to move toward and from each other, adjusting elements spaced from each other and connected to the heads, and a screw-shaft located between the adjusting elements and provided with a worm-gear, in combination with a shaft having worms that engage the worm-gears of both elements to rotate them in opposite directions. 35 40

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN EDWARD CAPS.

Witnesses:

LINWOOD M. HARRIMAN,
J. HOWARD WELCH.